

## Friction of a Shoe Lab

### Honors Physics

34 Points Total

The goal of this lab is to determine the static and kinetic coefficients of friction of a shoe.

Materials: Protractor, spring scales with various measuring scales.

#### Instructions:

1. Measure the weight of the shoe with a spring scale.
2. Place the shoe on the table and attach a spring scale to it. Use the protractor to measure the angle that the spring scale makes with the table.
3. Pull on the spring scale until the shoe begins to move. The force where it begins to move is the maximum applied force.
4. Use Newton's second law and the friction equation to solve for the coefficient of static friction.
5. For the coefficient of kinetic friction experiment, pull the shoe at a constant velocity. This will make the problem an equilibrium problem, which will simplify the calculations.
6. The force measured by the spring scale is the applied force, and this will be used in the calculations for the coefficient of kinetic friction.

#### Rubric for determining the coefficient of static friction:

1. Procedure (3 points).
2. Drawing of setup (1 points).
3. Free-body diagram of shoe (2 points).
4. List of variables measured and calculated, with their values for each trial (3 points).
5. Calculations of variables (4 points).
6. Sources of error and ways to minimize the sources of error (2 points; 1 each).
7. Conclusion sentences (2 points).

#### Rubric for determining the coefficient of kinetic friction:

1. Procedure (3 points).
2. Drawing of setup (1 points).
3. Free-body diagram of shoe (2 points).
4. List of variables measured and calculated, with their values for each trial (3 points).
5. Calculations of variables (4 points).
6. Sources of error and ways to minimize the sources of error (2 points; 1 each).
7. Conclusion sentences (2 points).